

Report for 2005MT71B: STUDENT FELLOWSHIP: Factors that influence displacement of native cutthroat trout by nonnative brook trout

Publications

- There are no reported publications resulting from this project.

Report Follows

Montana Water Center – Student Fellowship Award 2005

Factors that influence displacement of native cutthroat trout by nonnative brook trout Final Report for 2005

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Abstract: Declines in the abundance, distribution, and genetic diversity of westslope and Yellowstone cutthroat trout (*Oncorhynchus clarkii lewisi*; *O. c. bouveri*; CT) throughout their native ranges have led to the need for fisheries managers to understand the mechanisms responsible for population declines so they can develop effective conservation and recovery programs. Factors associated with these declines include introductions of nonnative fishes, habitat changes, and over-exploitation. Many habitats previously occupied by CT in the Northern Rocky Mountains now contain populations of other nonnative trout, particularly brook trout *Salvelinus fontinalis*, indicating that brook trout may displace CT. However, little information exists detailing the mechanisms responsible for this displacement of cutthroat trout by brook trout. My research has focused on how watershed conditions influence the persistence of cutthroat trout, especially on how these conditions influence the displacement of cutthroat trout by nonnative brook trout. During 2005 I completed an extensive literature review, compiled four datasets for analyzing what habitat factors influence the presence and abundance of cutthroat trout and brook trout, analyzed one of these datasets, conducted a preliminary evaluation of the response of westslope cutthroat trout to removal of brook trout from several stream reaches within the upper Missouri River basin, evaluated food availability and use by cutthroat and brook trout in two streams, and conducted a preliminary experiment to assess competition between age-0 cutthroat trout and age-0 brook trout. My preliminary analyses of 144 sample sites within Montana indicated that stream size, latitude, riparian use, proportion of fine sediments in streambeds, water temperature, and pool features influence the presence or absence of both brook trout and cutthroat trout. Using these variables I was able to correctly classify the presence or absence of cutthroat trout in 85-95% and brook trout in 80-90% of the tested sample sites using various multivariate techniques. I found little difference in the food items used by age-2 and older brook and westslope cutthroat trout during the summer in two streams. The response of westslope cutthroat trout to the removal of brook trout indicated that displacement of cutthroat trout by brook trout likely occurs at an early age, probably age-0 to age-1, as abundances of age-0 cutthroat trout increased dramatically following brook trout removal. I begin further testing this preliminary conclusion in 2005 and will continue this experiment in 2006. Preliminary results suggest that age-0 cutthroat trout have little fat reserves going into the winter period and brook trout may limit the ability of age-0 cutthroat trout to build

up fat reserves prior to winter. These preliminary analyses and results will direct my future research.

Research Accomplishments: Completed an exhaustive literature review. Compiled four relatively large databases (144 to 4,000 sites in each) for evaluating influence of habitat on presence and abundance of cutthroat and brook trout. Completed preliminary analyses on one of these databases. Conducted two pilot experiments to evaluate effects of brook trout on cutthroat trout. Evaluated the response of cutthroat trout to brook trout removal in four different stream reaches to determine age where interactions between these two species may be most critical.

Conclusions (Preliminary):

1. Preliminary analyses indicate several habitat variables can be used to classify whether cutthroat trout or brook trout will be present or absent from a relatively high proportion of potential sites; however, further testing of these preliminary results is necessary.
2. Brook trout can displace cutthroat trout from some stream habitats.
3. Age-0 to age-1 cutthroat trout appear most susceptible to displacement by brook trout because this age class responded most dramatically to the removal of brook trout; however, the exact mechanism still remains unclear.
4. Preliminary results suggest that age-0 cutthroat trout have very low fat reserves going into their first winter and age-0 brook trout may influence fat reserves of age-0 cutthroat trout.
5. Competition for food by age-2 and older brook and cutthroat trout might be important as little difference was seen between food items used between these two species during the summer.